MERCURY IN UTAH WATERFOWL

Cooperators

- Tom Aldrich, Utah Division of Wildlife Resources
- Clay Perschon, Great Salt Lake Ecosystem Coordinator, Utah Division of Wildlife Resources
- Josh Vest, Department of Forest, Range and Wildlife Science, Utah State University

BACKGROUND

- 2003 USGS finds Hg levels in GSL water, among highest ever measured
- 25X higher than levels in FL
- 2005 USGS finds elevated Hg in brine shrimp, grebe livers from GSL
- 2005 Utah becomes 47th state to issue Hg health advisory for eating fish
- 2005 Utah waterfowl hunters request, DWR agrees to analysis of waterfowl tissue from GSL

Sources of Hg

- Natural
  - Geothermic/Volcanic
- Historic mining practices
- Atmospheric Sources
  - Coal fired power plants (All over the west)
  - Ore roasters (Nevada)
  - Global Hg Production (China)
- Hg in GSL likely not new
- Working Group established

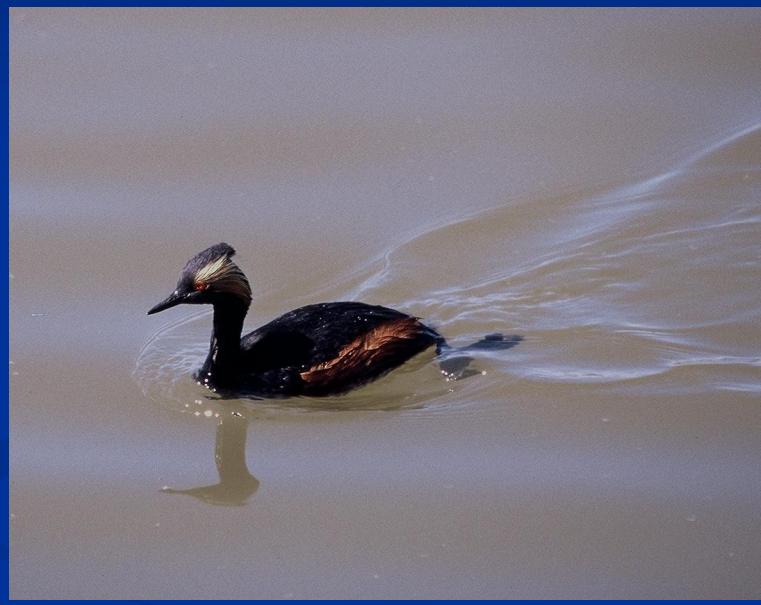
Hg IMPACTS to HUMANS

- Impacts nervous system development and function
  - Organ and tissue growth
  - Brain development and function
  - Particular concern to pregnant women and children

Acute Behavioral Abnormalities

Hg IMPACTS to BIRDS

- ADULTS
  - Decreased Nesting Effort
  - Increased Nest Abandonment
  - Decreased Survival Rates
  - Direct Mortality
- YOUNG
  - Teratogenic/Mutagenic
    - No eyes, brain outside skull, malformed appendages
  - Decreased Growth rates



Hg Interactions with Selenium

- Synergistic
  - Female mallard reproduction decreased when fed Hg and Se together in doses not singly affective
- Antagonistic
  - Male mallard survival increased when fed Hg and Se together in doses that singly were acutely toxic

Chronology of Mercury Concerns at the Great Salt Lake

- 2003-2004
  - USGS research identifies elevated methylmercury levels
  - DEQ/DWR surveys identify elevated mercury levels in fish
- 2005
  - Utah Waterfowlers Association questions mercury levels in ducks

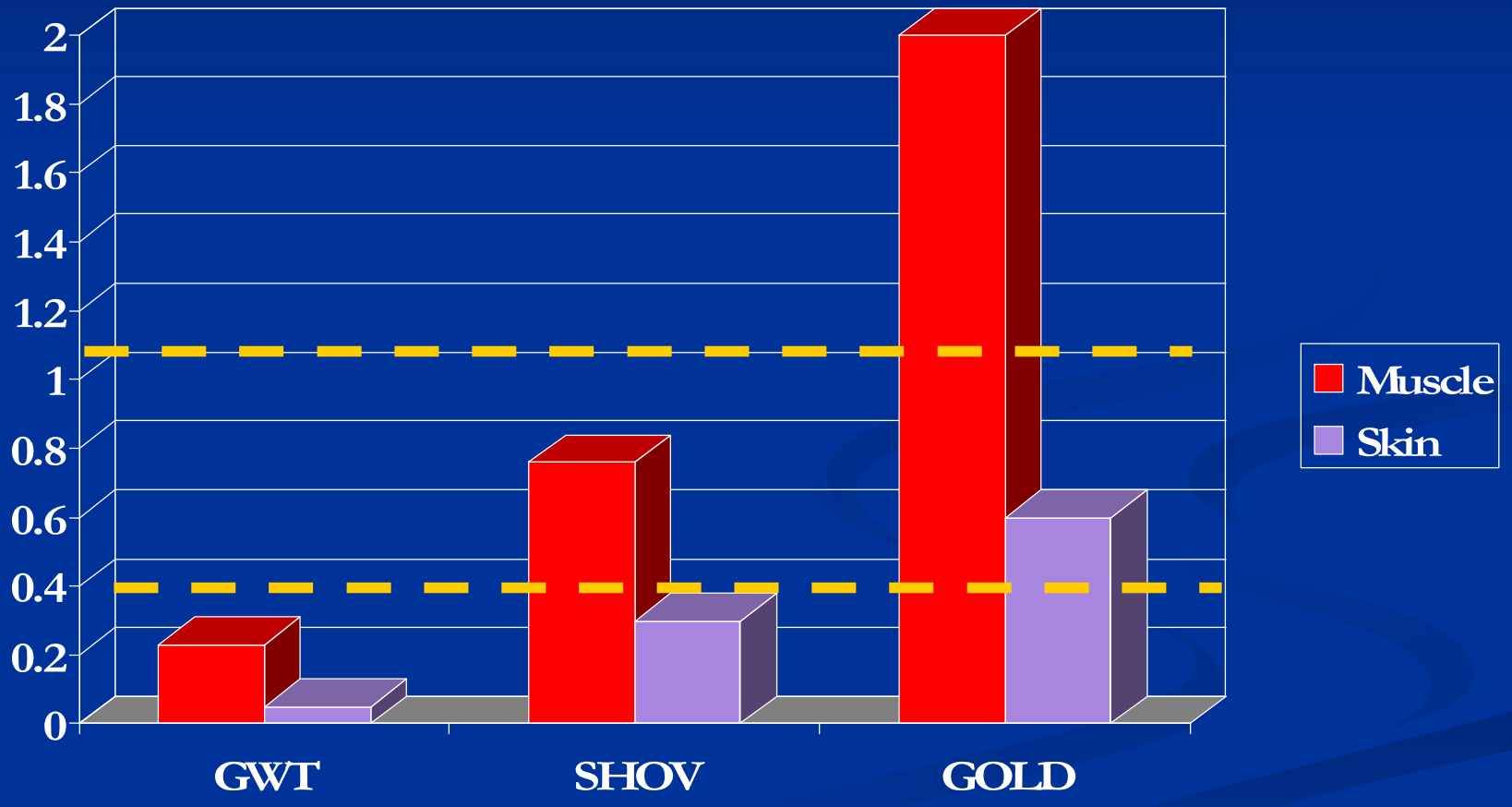
DWR Initiates Mercury Study

- USU researchers contracted by GSLEP study winter waterbird diet at GSL
- Ducks, gulls, and grebe collected for dietary analysis in 2004
- Samples from birds analyzed in summer 2005

Initial Hg Tissue Samples

- Archived samples GWT, SHOV, GOLD
- Collected Winter 2004, food habitat study
- Collected mostly from GSL South Arm
- Represent “worst case scenario”
- Tested eatable tissue (skin, breast muscle)

2004 Mean Hg Levels (ppm)



2005 UTAH HEALTH ADVISORY

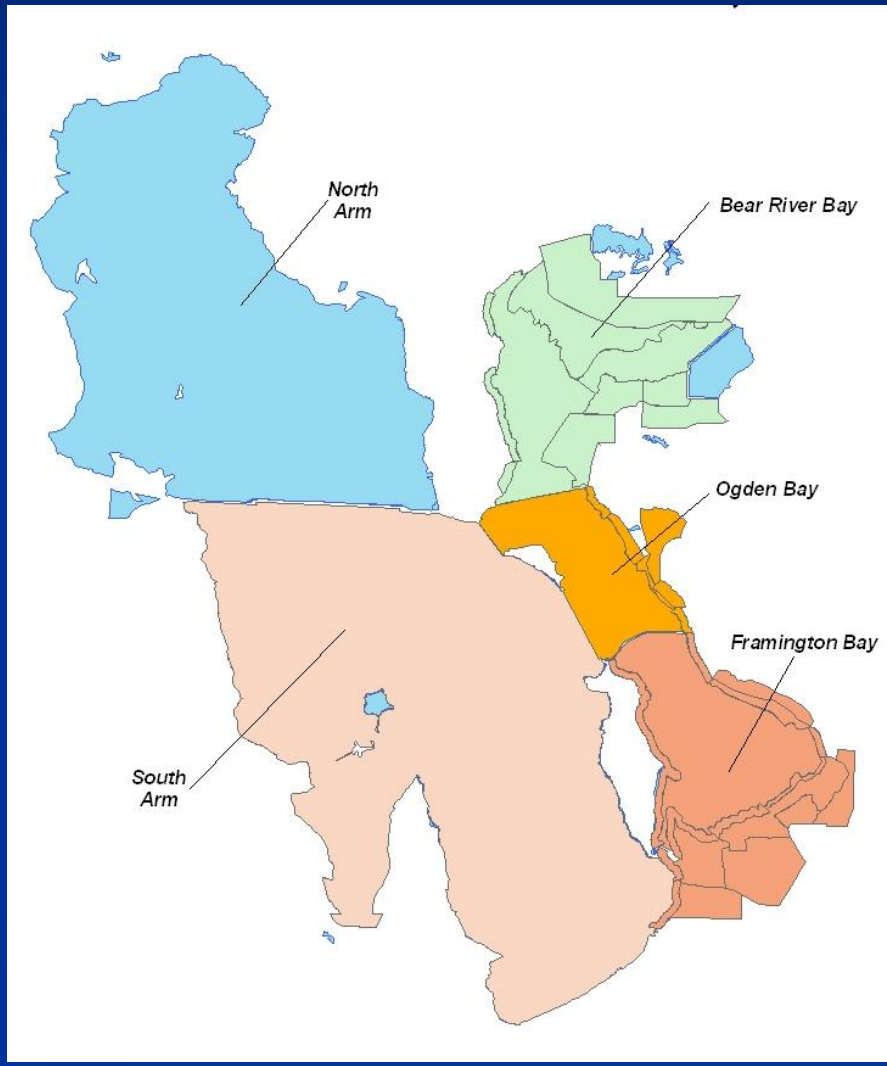
- DOH, DWR, DEQ jointly issued advisory to not eat SHOV and GOLD
- Issued 2 days before the duck season, posted advisories
- First health advisory for consuming waterfowl in North America
- Unique as “do not eat” rather than frequency of meals

Hg HUMAN HEALTH SCREENING LEVELS IN FOOD

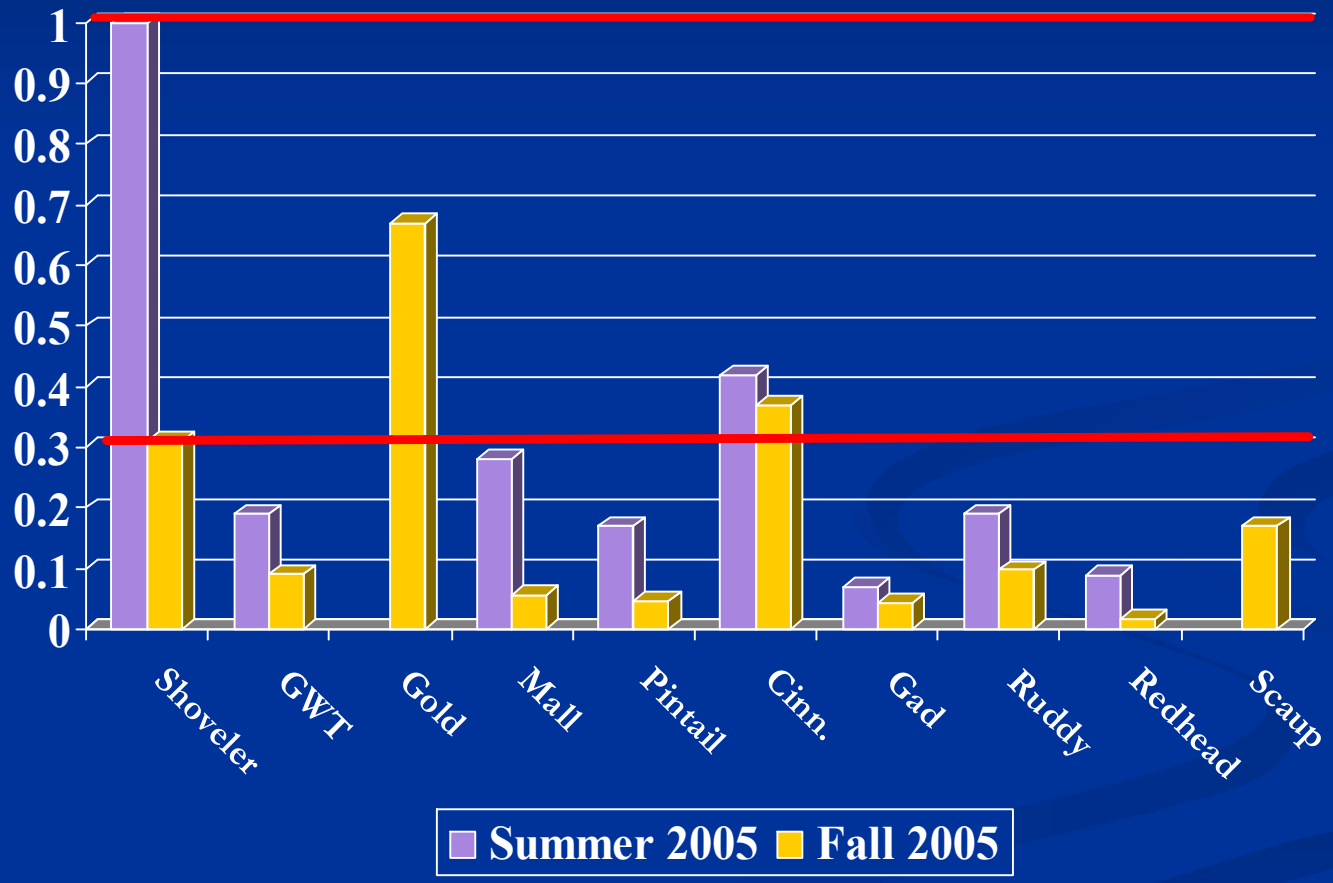
- FDA (Regulates Commercial Food Commodities) 1 ppm
  - eg Tuna, Beef, Chicken
- EPA (Standards for Fish and Wildlife) .3 ppm
- Utah Department of Health uses EPA Standard

DWR Mercury Study
Second Phase, Fall 2005

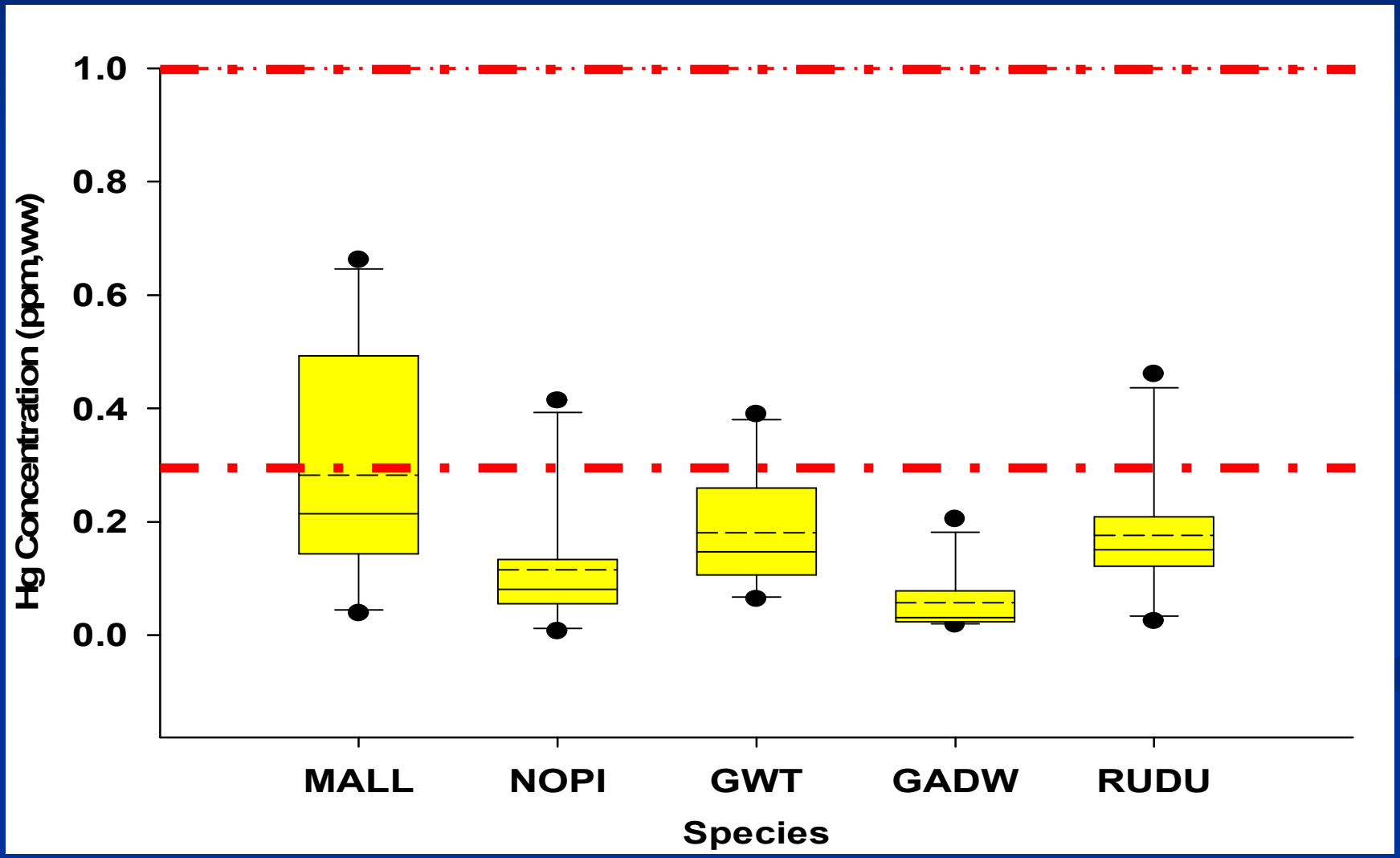
- Temporal and spatial survey of migratory and local GSL ducks commonly harvested by hunters
  - Late summer, fall, and winter
  - Bear River Bay, Ogden Bay, Farmington Bay, and South Arm
- Robust sample sizes
  - Samples collected fall 2005 and winter of 2006
  - Data received late summer 2006
- Public health focus



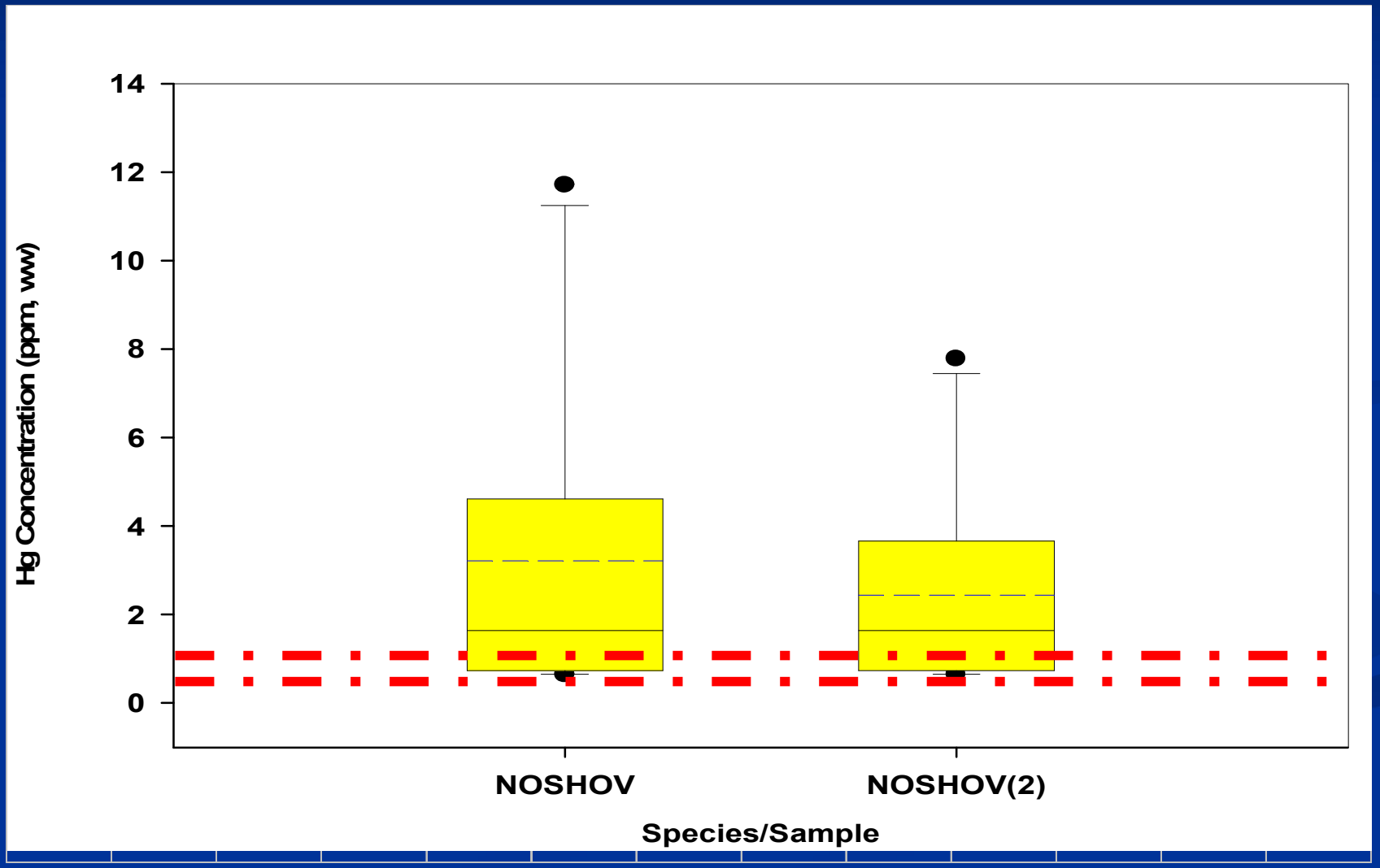
2005 Summer-Fall Mercury Comparisons



2005 Hg Levels in Muscle Tissue Summer Sample



2005 Hg Levels in Muscle Tissue Summer Sample



Utah DOH Advisory Issued September 2006
(allowable consumption)

- Common Goldeneye
  - Adults
    - Eat no more than one 8-ounce meal of Common Goldeneye per month
  - Children, women who are or might become pregnant
    - Do not eat Common Goldeneyes
- Northern Shoveler and Cinnamon Teal
  - Adults
    - Eat no more than two 8-ounce meals of Northern Shoveler and Cinnamon Teal per month
  - Children, women who are or might become pregnant
    - Eat no more than one 4-ounce meal of Northern Shoveler and Cinnamon Teal per month

DWR Mercury Study
Third Phase, Fall 2006

- Canada geese and coots sampled
- Analysis currently being conducted
- Fourth study phase being planned
  - Focus on late summer and early fall

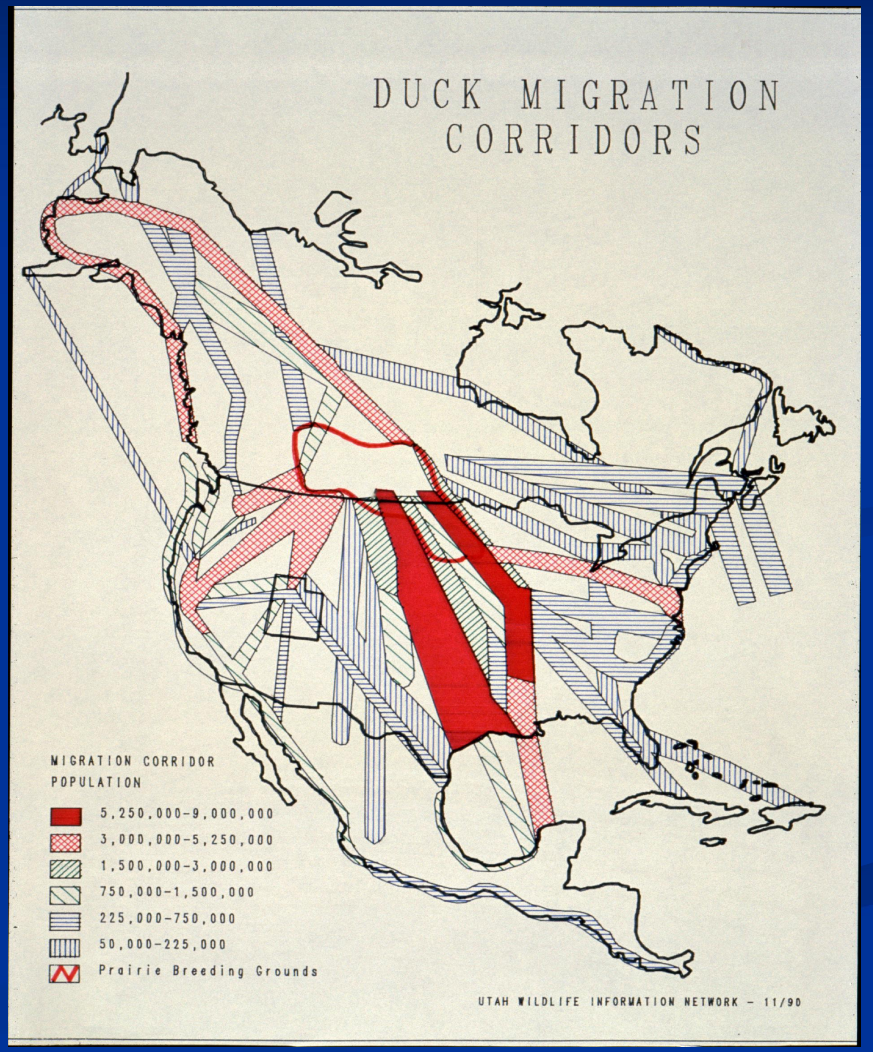
Other Published Hg Studies

	GWT	SHOV	GOLD
GSL	.23	.76	2.01
NEVADA	.07	.16	.40
MANITOBA	.13	.28	.12
IOWA	.06	.14	??

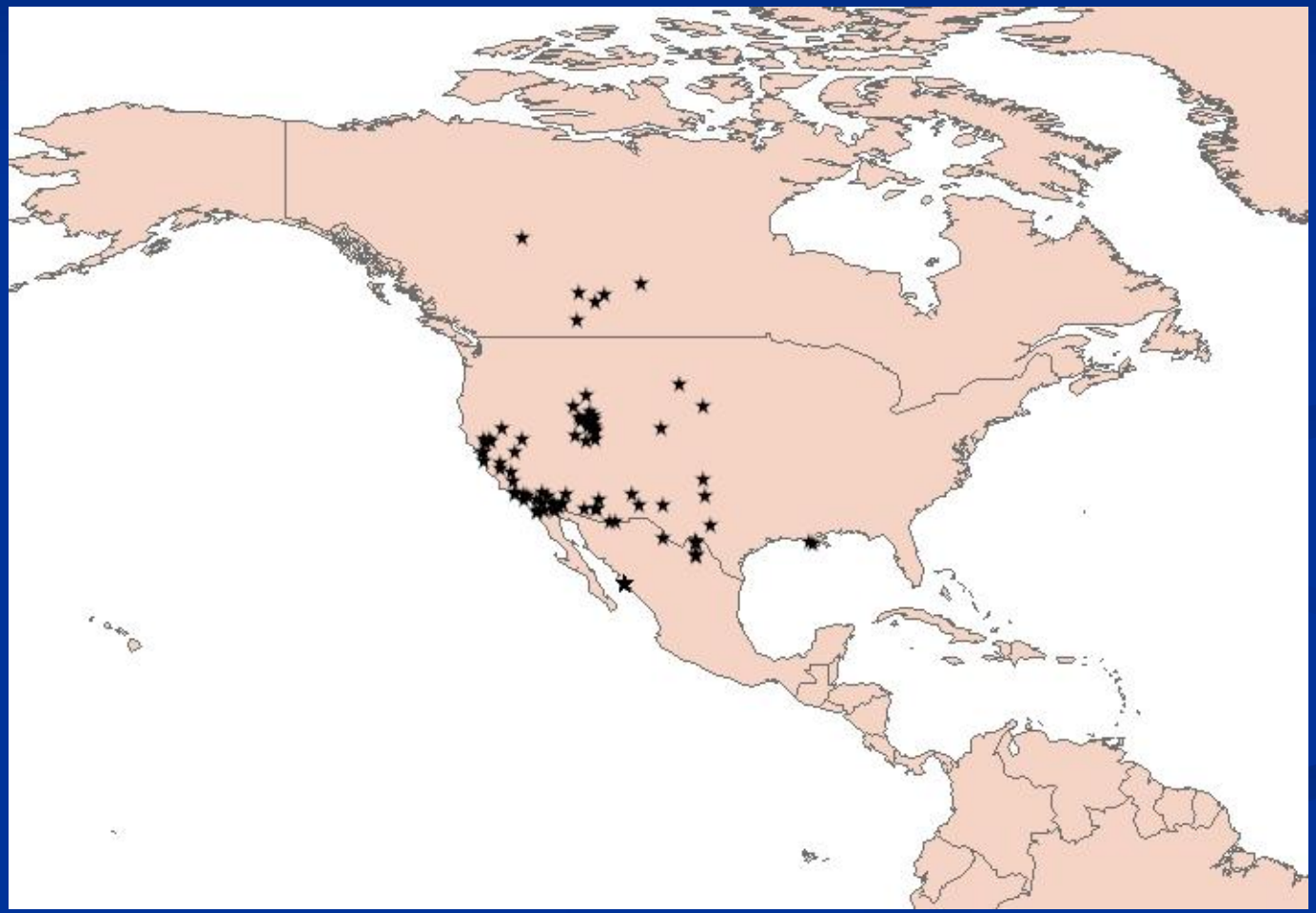
So Who Eats Utah Ducks Anyway?

Duck Migration Corridors

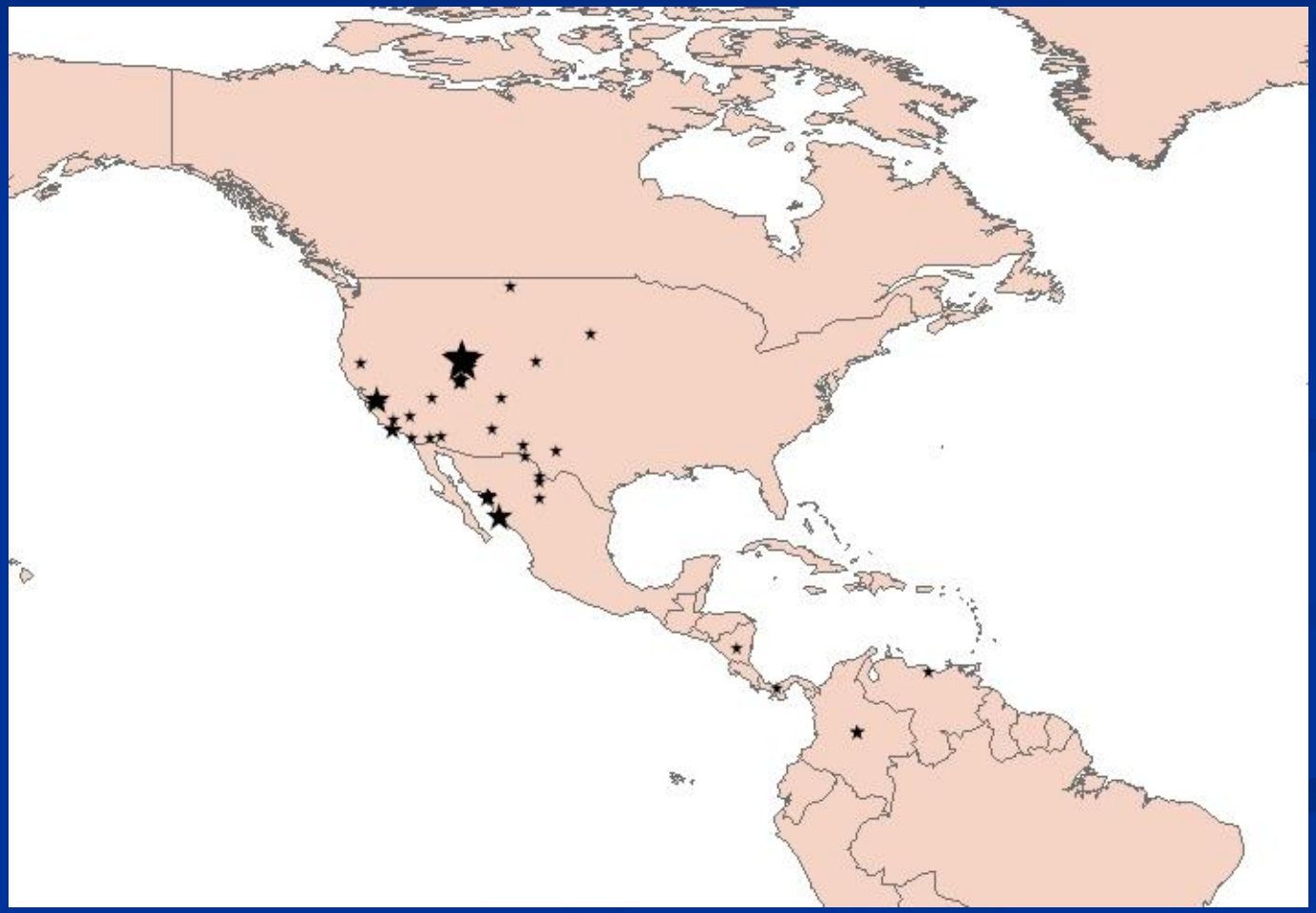
- 3-5 Million Ducks to Utah Annually
- Derived from Alaska, NWT, Western Canadian Provinces, Adjacent States
- Winter in Calif., W. Mexico, Gulf Coast, Central America



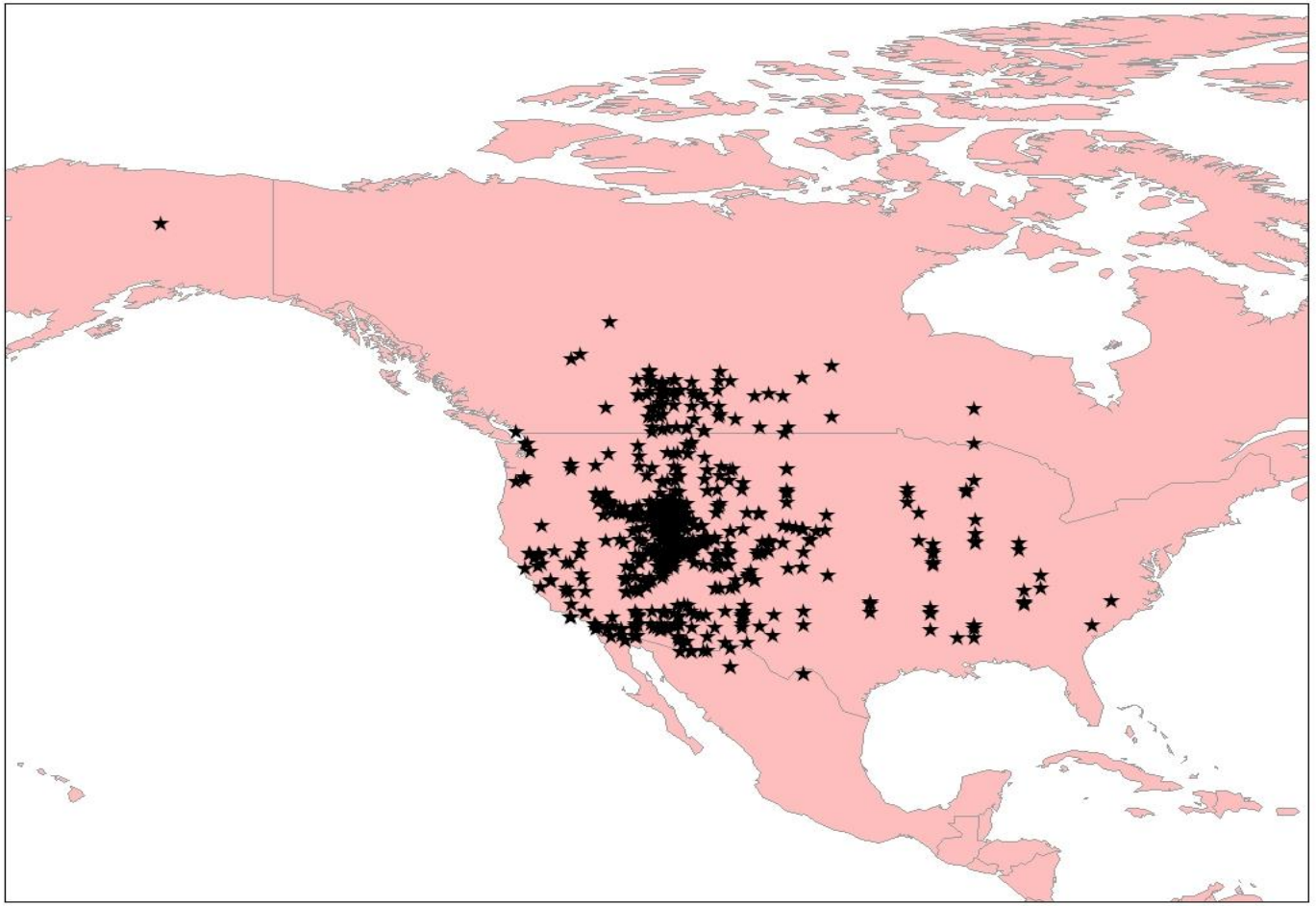
SHOVELER BAND RECOVERIES



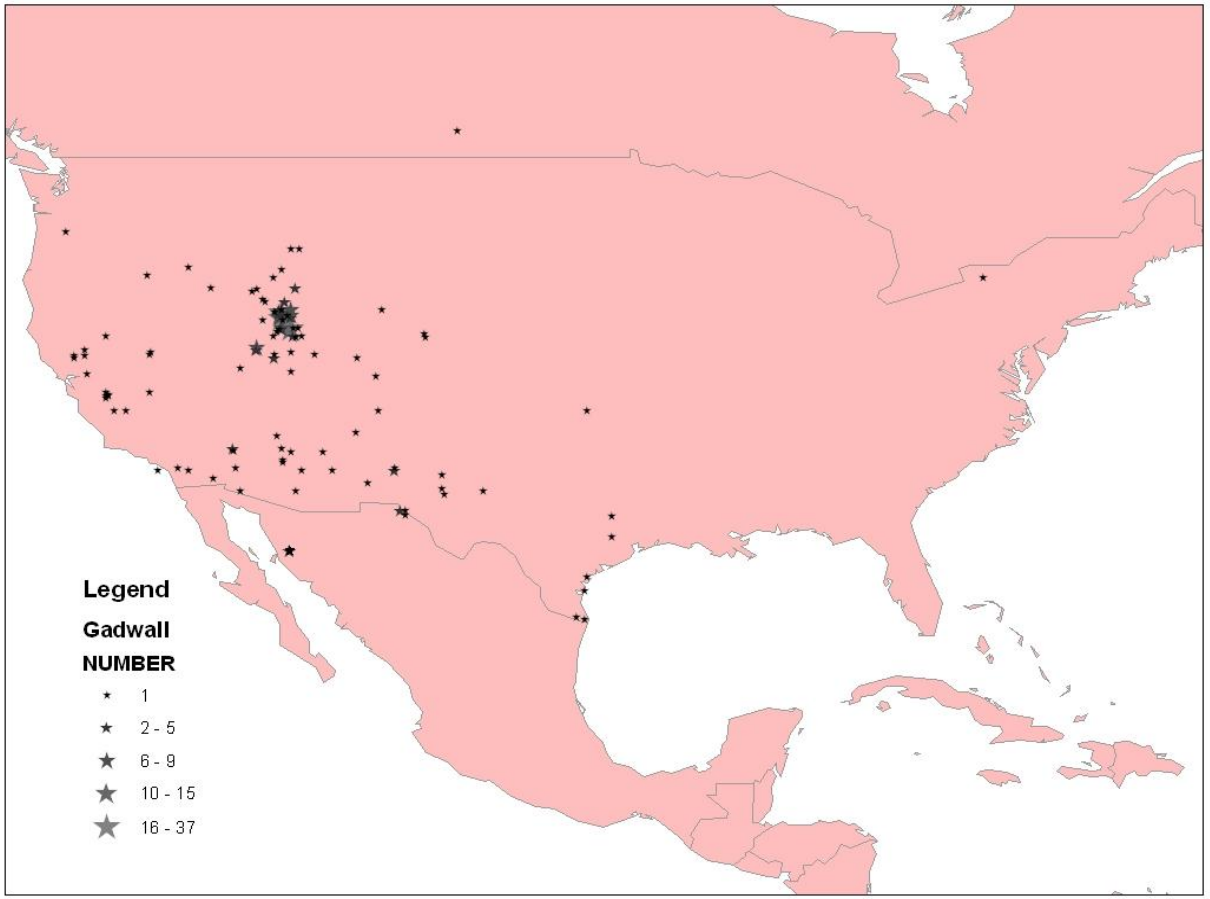
CINNAMON TEAL BAND RECOVERIES



MALLARD BAND RECOVERIES



GADWALL BAND RECOVERIES



What's Next

- Expand sampling to other species, drainages, seasons……. modify health advisory
- Begin to explore impacts to avian reproduction and survival
- Continue to explore sources and sinks of Hg in the GSL